

REMARKS

Claim Status

Claims 1, 4, 6-15, and 18-28 are pending. Claims 2, 3, 5, 16, 17, and 29 stand withdrawn. Claims 1, 4, 6-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 4,711,266 to Leiber, hereinafter "Leiber" in view of U.S. Patent No. 4,321,570 to Tsunefuji, hereinafter "Tsunefuji." Claims 18, 26, and 28 stand rejected under 35 U.S.C. § 103 as being unpatentable over Leiber in view of U.S. Patent No. 4,664,136 to Everett, hereinafter "Everett." Claims 19-20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Leiber in view of U.S. Patent No. 3,455,472 to Franz, hereinafter "Franz." Claims 21-25 stand rejected under 35 U.S.C. § 103 as being unpatentable over Leiber in view of U.S. Patent No. 3,022,450 to Chase, Jr., hereinafter "Chase." Claim 27 stands rejected under 35 U.S.C. § 103 as being unpatentable over Leiber in view of U.S. Patent No. 6,125,803 to Hattori et al., hereinafter "Hattori."

Claims 1, 6, and 25 have been amended. Claims 30 and 31 have been added. No new matter has been added.

Applicant respectfully traverses the grounds for rejection and requests reconsideration and withdrawal of the rejections of claims 1, 4, 6-15, 18-23, and 25-28 in view of the following.

Rejections Under 35 U.S.C. § 103

Independent Claims 1 and 6

Independent claims 1 and 6 each include features that are neither disclosed nor suggested by the cited references, either taken alone or in combination, namely as represented by claim 1,

1. (Currently Amended) An electromagnetic actuator comprising:
a housing defining a cavity therein;
a solenoid coil disposed in the cavity of the housing;
an armature disposed substantially coaxially with the solenoid coil, wherein the armature can move between a first position proximate a portion of the housing and a second position distal of the portion of the housing, in the second position the armature and the portion of the housing define a first gap therebetween;
an extension member extending in an axial direction into the first gap and defining a second gap, the width of the second gap being less than the width of the first gap; and

a permanent magnet disposed in the housing coaxially with a central axis of the armature and coaxially with a central axis of the solenoid, the permanent magnet facing the armature, the permanent magnet and the armature being on opposite sides of the first gap, wherein the permanent magnet biases the armature towards the solenoid. (emphasis added)

Claims 1 and 6 are directed to an electromagnetic actuator having a housing, a solenoid coil, an armature, and a permanent magnet. The armature can move between a first position proximate a portion of the housing and a second position distal of the portion of the housing. In the second position, the armature and the portion of the housing define a first gap. The actuator also includes an extension member extending in an axial direction into the first gap and defines a second gap, the width of the second gap being less than the width of the first gap. The permanent magnet is disposed coaxially with a central axis of the armature and coaxially with a central axis of the solenoid. The permanent magnet faces the armature, the permanent magnet and the armature being on opposite sides of the first gap. In this manner, the extension member and the orientation of the permanent magnet may combine to provide high initial forces.

Leiber does not disclose or suggest a permanent magnet (conceded by the examiner in the Office Action at page 3, first paragraph). As such, the examiner relies on Tsunefuji as disclosing a permanent magnet. In Tsunefuji, however, permanent magnet 12 is not disposed coaxially with a central axis of armature 13 and coaxially with a central axis of solenoid 14. In contrast, solenoid 14 is offset from a central axis of armature 13 and from a central axis of permanent magnet 12 (Tsunefuji Fig. 3).

Accordingly, applicant submits that the cited references, either taken alone or in combination, do not disclose or suggest the features of independent claims 1 and 6. Additionally, inasmuch as dependent claims 4, 7-15, 18-23, and 25-28 (which have also been rejected over the cited references) are dependent on claims 1 or 6, these claims are patentable over the cited references, at least by virtue of their dependency. Accordingly, applicant respectfully requests reconsideration and withdrawal of the rejections of claims 1, 4, 6-15, 18-23, and 25-28 under 35 U.S.C. § 103.

New Claims

Claim 30-31 have been added to further define the invention. The new claims find support in the specification as originally filed at least in Figures 1-4. Claims 30 and 31 include the feature of the extension member extending into the first gap from only a portion of the housing. In the previous office action, the examiner treated claim 29 as being constructively withdrawn, stating that the claim 29 was directed to a non-elected invention, citing to 37 CFR 1.142(b) and MPEP 821.03. Rule 37 CFR 1.142(b) states that the applicant may be required to restrict claims if "the applicant presents claims directed to an invention distinct from and independent of the invention previously claimed." As such, by constructively restricting claim 29, the examiner has admitted that the addition of this feature patentably defines over claim 1 as previously presented. As none of the cited references discloses this feature, applicant submits that claims 30 and 31 are allowable over the cited references, as well as being allowable based on their dependency from claims 1 and 6, respectively.

Conclusion

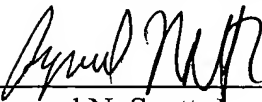
For all the foregoing reasons, applicant respectfully submits that the present application is now in condition for allowance. Reconsideration of the Office Action and an early Notice of Allowance are respectfully requested. In the event that the examiner cannot allow the present application for any reason, the examiner is encouraged to contact the undersigned attorney, Raymond N. Scott Jr. at (215) 564-8951, to discuss resolution of any remaining issues.

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Woodcock Washburn LLP
One Liberty Place - 46th Floor
Philadelphia PA 19103
Telephone: (215) 568-3100
Facsimile: (215) 568-3439

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Raymond N. Scott, Jr.
Attorney for Applicant
Registration No. 48,666